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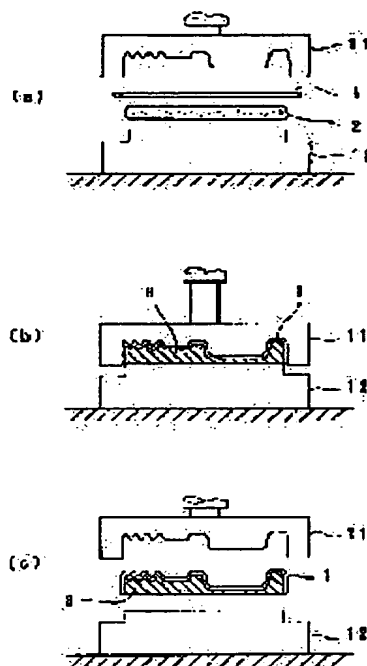
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## (54) FIBER REINFORCED PLASTIC MOLDED PRODUCT AND ITS PRODUCTION

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve the adhesion of a molded object and a decorative sheet and to apply sharp and fine printing.  
**SOLUTION:** A decorative sheet 1 wherein a biaxially stretched polyester resin layer and an ABS resin layer are successively laminated is prepared and an uncured compsn. 2 is superposed on the ABS resin layer of the decorative sheet 1 and both of them are heated and pressed within a mold consisting of upper and lower molds to be integrated mutually. By using the biaxially stretched polyester resin layer, the sheet itself does not generate deformation, flow, breakage or the like even with respect to heat at the time of molding or stress by the flowability of SMC and a printing pattern layer is protected from the flow of SMC or a styrene monomer by the lined ABS resin layer and made to be properly compatible with FRP to develop strong adhesion.



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CLAIMS

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[Claim(s)]

[Claim 1] Fiber-reinforced-plastics mold goods characterized by the ABS-plastics layer and it being further alike and coming to carry out the laminating unification of the biaxial extension polyester resin layer on that front face at this order one by one on the front face of the mold goods which consist of a hardened material of the thermosetting resin reinforced with fiber reinforcing materials.

[Claim 2] The manufacture approach of the fiber-reinforced-plastics mold goods characterized by preparing the ornament sheet with which it comes to carry out the laminating of a biaxial extension polyester resin layer and the ABS-plastics layer one by one, carrying out heating pressurization of SMC or BMC within superposition and metal mold so that it may touch the ABS-plastics layer side of this ornament sheet, and unifying both.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fiber-reinforced-plastics (FRP=Fiber Reinforced Plastic) mold goods fabricated by SMC (Seet molding compound), BMC (Bulk molding compound), etc. and its manufacture approach.

[0002]

[Problem(s) to be Solved by the Invention] Although the approach (for example, reference, such as JP,48-12876,A and JP,51-20951,A) of carrying out the shaping coincidence unification of titanium paper, a nonwoven fabric, cloth, the impregnated paper, etc. is conventionally learned as an approach of manufacturing fiber-reinforced-plastics (FRP) mold goods with a pattern this approach — \*\* — \*\* to which does not have \*\* moldability which cannot perform clear printing, and which \*\* tear etc. tends to produce, and a configuration is restricted — there is a fault said that the adhesive variation by process conditions, such as temperature and a pressure, is large since it is adhesion of a physical anchor effect.

[0003] Moreover, although the approach of the melting temperature which printed backing a nonwoven fabric with 2 liquid hardening mold polyurethane resin adhesive to the sheet plastic more than FRP molding temperature, and making this sheet unify at the time of shaping was also taken so that it might be indicated by JP,7-60911,A, by this approach, there was a trouble that the quality of a nonwoven fabric was unstable to the top where the process of backing is complicated, and cost reached it highly by formation nonuniformity etc.

[0004] Moreover, as an option, so that it may be indicated by JP,56-72930,A etc. Although an adhesive property with SMC resin is good, namely, the method of making melting, the sheet plastic which becomes soft, or swells and dissolves of the component of SMC, or the makeup sheet using printing ink unify at the temperature at the time of SMC shaping at the time of shaping is also learned By this approach, there is a trouble that a printing layer is passed with the heat at the time of heat curing of SMC or the stress at the time of a flow, and a defect comes out.

[0005] Highly, the place which this invention is made in view of the above troubles, and is made into the purpose has a good moldability, and that of adhesion with a Plastic solid and an ornament sheet is good, and the flexibility at the time of heating and pressurization and reinforcement are to offer the fiber-reinforced-plastics mold goods which can perform clear and delicate printing, and its manufacture approach.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, it is further alike and a biaxial extension polyester resin layer is characterized by the ABS (acrylonitrile-butadiene-styrene copolymer) resin layer and coming to carry out laminating unification at this order one by one on that front face at the front face of the mold goods which consist of a hardened material of the thermosetting resin with which the fiber-reinforced-plastics mold goods of this invention were reinforced with fiber reinforcing materials.

[0007] The above-mentioned fiber-reinforced-plastics mold goods are manufactured by preparing the ornament sheet with which it comes to carry out the laminating of a biaxial extension polyester resin layer and the ABS-plastics layer one by one, carrying out heating pressurization of the raw material (or intermediate field) of FRP, such as SMC or BMC, within superposition and metal mold so that it may touch the ABS-plastics layer side of this ornament sheet (it is also only hereafter called a "sheet"), and unifying both.

[0008] while protecting a printing pattern layer from a flow and styrene monomer of SMC by the ABS-plastics layer which the sheet itself did not produce deformation, a flow, a tear, etc. to the stress by the heat at the time of shaping, or the fluidity of SMC by using a biaxial extension polyester resin layer, and was backed with this invention as mentioned above — a moldability moderate on a sheet — giving — in addition — and it can dissolve moderately with FRP and firm adhesion can be discovered.

[0009]

[Embodiment of the Invention] The polyester sheet which produced the film beforehand is used as a biaxial extension polyester resin layer. This sheet is excellent in transparency, tensile strength, thermal resistance, dimensional stability, a printability, resistance to contamination, solvent resistance, etc. Although a 10-200-micrometer thing can be used as thickness, it is about 20-100 micrometers desirably. If too thick [ if too thin, reinforcement and a feeling of depth will fall, and ], it is not good in respect of a printability, a moldability, and cost. As polyester resin, polyethylene terephthalate, polybutylene terephthalate, an ethylene terephthalate isophthalate copolymer, polyethylenenaphthalate, polyarylate, etc. are typical.

[0010] What is generally manufactured as a sheet is used as an ABS (acrylonitrile-butadiene-styrene copolymer)

resin layer. This is comparatively cheap also in cost. Melting adhesion is carried out with the styrene monomer in FRP (mainly unsaturated polyester resin), and the heat and pressure at the time of shaping, and it can paste up in compatibility. Moreover, it intercepts that the styrene monomer in FRP reaches coincidence at an ornament layer, and an ornament layer flows. Although thickness can use a 10–500-micrometer thing, it is about 50–200 micrometers desirably. If too thin, it fuses at the time of shaping and a printing layer cannot be protected. If too thick, the curvature of mold goods will become large or will become a cost rise. The moldability of the whole ornament sheet is made to improve according to moderate heat deformation of an ABS-plastics layer.

[0011] In order to make the weatherability of the layer itself or FRP [ directly under ] improve in a biaxial extension polyester resin layer if needed, light stabilizer, such as ultraviolet ray absorbents, such as benzotriazol, a benzophenone, and particle cerium oxide, and a hindered amine system radical scavenger, may be added in a layer. An ultraviolet ray absorbent and light stabilizer of an addition are about 0.1 – 5 % of the weight. Moreover, in a biaxial extension polyester resin layer, coloring agents, such as a color and a pigment, may be added if needed within limits which do not lose transparency.

[0012] As thermosetting resin which is the component of FRP, an unsaturated polyester resin, vinyl ester resin, diallyl phthalate resin, heat-curing mold acrylic resin, melamine resin, guanamine resin, phenol resin, an epoxy resin, 2 liquid hardening mold polyurethane resin, etc. are mentioned.

[0013] In order to make mold goods from these thermosetting resin, the non-hardened constituent which added various additives to what added the cross linking agent, the polymerization initiator, or the reaction accelerator catalyst to the monomer or prepolymer (oligomer is also included) of these resin first if needed in addition to this with fiber reinforcing materials, such as a staple fiber, textile fabrics, and a nonwoven fabric, is prepared. There is a gestalt of SMC or BMC as the raw material of this non-hardened constituent, i.e., FRP, or a gestalt of intermediate field.

[0014] And as shown in drawing 1 (a), the ornament sheet 1 and the non-hardened constituent 2 are piled up and inserted into the die (a punch 11 and female mold 12) of a predetermined configuration. As shown in drawing 1 (b), a mold is closed and pressurized [ heat and ], the front face of mold goods 3 carries out the adhesion unification of the ornament sheet 1 at the same time it uses the non-hardened constituent 2 as the solid mold goods 3 bridge formation or by carrying out a polymerization and making it harden, and makeup material as shown in drawing 1 (c) is obtained. In that case, the unreacted components in an FRP raw material or intermediate field (monomer etc.) permeate into the ABS plastics in the ornament sheet 1, and the adhesive strength between the ornament sheet 1 and mold goods 3 is reinforced.

[0015] If SMC which is the typical gestalt of a non-hardened constituent is explained in full detail, the ingredient of SMC will consist of thermosetting resin which kneaded fiber reinforcing agents, such as a glass fiber, a carbon fiber, asbestos, and potassium titanate, the catalyst, the bulking agent, the release agent, etc. The thermosetting resin used usually has the typical prepolymer of an unsaturated polyester resin. As a fiber reinforcing agent, the staple fiber of a glass fiber is usually used. The content of this glass fiber is usually 10 – 70 % of the weight. As a bulking agent, powder, such as a calcium carbonate, a barium sulfate, and an aluminum hydroxide, is used. Zinc stearate etc. is used as a release agent. In addition, coloring agents, such as hardening accelerator catalysts, such as polymerization initiators (curing catalyst), such as cross linking agents, such as reaction diluents, such as a styrene monomer and a polyfunctional acrylate (or methacrylate) monomer, isocyanate, and an amine, a benzoyl peroxide, methyl ethyl ketone peroxide, t butyl par PENZO eight, and an organic sulfonate, naphthenic-acid cobalt, and manganese naphthenate, a titanium dioxide, carbon black, and rouge, etc. are added if needed.

[0016] Although the ornament processing which gives a biaxial extension polyester resin layer and an ABS-plastics layer to the sheet which carries out a laminating is possible also for kneading and giving itself of one of the two of the biaxial extension polyester resin layer in this sheet, and an ABS-plastics layer, or both coloring agents, such as a color and a pigment, generally gravure, silk screen printing, etc. perform and printing patterns are a grain shank, a grain shank, a texture shank, an alphabetic character, a geometrical pattern, whole surface solid, etc. When there is the need of concealing FRP mold goods, a whole surface solid layer is further prepared in the FRP (SMC) side of a pattern, and the high pigment of concealment nature, such as a titanium dioxide and carbon black, is added in the whole surface solid layer. Printing ink consists of various pigments (or color) and binder resin. A binder is suitably chosen from 2 liquid hardening mold urethane resin, acrylic resin, polyester resin, a vinyl chloride vinyl acetate copolymer, cellulose system resin, polyvinyl butyral resin, etc., and is used. Moreover, as ornament processing, metal thin films, such as aluminum and chromium, may be formed by vacuum evaporation, sputtering, etc. In this case, the shape of the whole surface or a pattern has as a metal thin film. As long as the printing pattern layer metallurgy group thin film given as ornament processing has a transparent ornament sheet all layer, it may be given to the front face of an ABS-plastics layer, or may be given to a rear face (thermosetting resin side). In addition, easily-adhesive processing of corona discharge treatment, plasma treatment, easily-adhesive priming-coat processing, etc. may be beforehand performed to the resin layer (sheet) front face of the side which prints if needed.

[0017] The protective layer which consists of synthetic resin further may be formed on the front face of an ornament sheet if needed. This protective layer chooses a transparent (colorlessness or coloring) thing so that an ornament layer can be looked at through a fluoroscope. When thinking a moldability as important and thinking physical properties, such as surface abrasion-proof nature and chemical resistance, as important as resin, using thermoplastics, hardenability resin, such as thermosetting resin and ionizing-radiation hardenability resin, is used. Although what is necessary is just to decide thickness suitably according to a military requirement, it is usually about 1–100 micrometers. The aforementioned resin is used as thermoplastics. However, when using for a

protective layer, it is not necessary to add a reactant component. As thermosetting resin, 2 liquid hardening mold polyurethane resin, an epoxy resin, an unsaturated polyester resin, etc. have the monomer of polyfunctional partial saturation (meta) acrylate, or a typical prepolymer as ionizing-radiation hardenability resin. In addition, as ionizing radiation, ultraviolet rays or an electron ray is usually used. In raising weatherability, it adds the ultraviolet ray absorbent and/or light stabilizer like the above in a protective layer.

[0018] As an application of the fiber-reinforced-plastics mold goods of this invention, the cabinet of the interior material of vehicles, such as fittings, such as housing machines, such as interior material, such as a wall of a building, a floor, and head lining, an organ bath, a washstand, and a kitchen instrument, a window frame, and a door, a car, and a vessel, a container, and home electronics etc. can be mentioned.

[0019]

[Example]

(Example) The ornament sheet was produced as follows. namely, a biaxial extension polyethylene terephthalate sheet (the product made from the diamond foil "T-100" —) After printing the grain pattern of a marble tone marble to 25-micrometer thickness in gravure using the ink ("NL-ALFA made from a ZAINKU tech) which uses as a binder 2 liquid hardening mold polyurethane resin which consists of hexamethylene di-isocyanate and acrylic polyol and forming an ornament layer in it, 2 liquid hardening mold polyurethane resin adhesives ("E-295" by Dainichiseika Colour & Chemicals Mfg.) were used for the printing side, and dry laminate of the coloring ABS sheet (the product made of 3 treasure resin "A402", 30-micrometer thickness) was carried out.

[0020] As SMC (Takeda Chemical make) where an ABS side consists of an unsaturated polyester resin and glass fiber is touched in this ornament sheet, after installing superposition and these in a die, they are the molding temperature of 150 degrees C, and compacting pressure 100 kgf/cm<sup>2</sup>. Heating pressurization is carried out for 5 minutes, and while stiffening SMC, the adhesion unification of both was carried out. Thereby, the bath interior wall side panel of a high design was obtained. There were also no defects of an ornament sheet, such as a tear, and the adhesive property of a Plastic solid and an ornament sheet and the moldability were also good. Moreover, when exfoliation of an ornament sheet was tried, it did not exfoliate in the interface of a sheet and a Plastic solid.

[0021] (Example 1 of a comparison) The ornament sheet which performed the shank printing same to a DAP impregnated paper (what infiltrated the diallyl phthalate prepolymer into the titanium paper of basis-weight 100 g/m<sup>2</sup>) as an example was produced, and coincidence shaping was carried out with SMC like the example 1 using this ornament sheet. In mold goods, the tear of an ornament sheet and shank distortion had occurred partially.

[0022] (Example 2 of a comparison) The ornament sheet of the configuration of the same printing layer / half-rigid-polyvinyl-chloride resin (plasticizer DOP:20 weight section) coloring base sheet as the acrylic resin sheet / example of a polymethylmethacrylate system was produced, and coincidence shaping was carried out with SMC like the example 1 using this ornament sheet. The sheet was fused and torn and Siwa and shank flow had generated mold goods. Moreover, adhesion of SMC and a sheet was not enough, either.

[0023]

[Effect of the Invention] As explained above, according to this invention, there are also no faults, such as an exterior tear, Siwa, shank flow, and shank distortion, the expression by printing clear also in design can be performed, and FRP and the product pasted up firmly can be obtained.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is process drawing for explaining the manufacture procedure of fiber-reinforced-plastics mold goods.

[Description of Notations]

1 Ornament Sheet

2 Non-Hardened Constituent

3 Mold Goods

11 Punch

12 Female Mold

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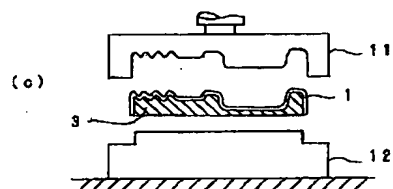
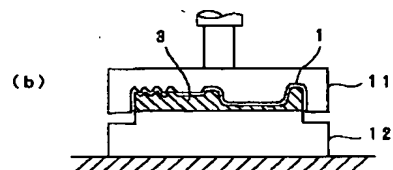
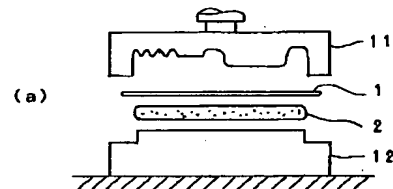
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(54) 【発明の名称】 繊維強化プラスチック成形品及びその製造方法

(57) 【要約】

【課題】 成形体と装飾シートとの接着も良好で、鮮明で繊細な印刷を施すことができる繊維強化プラスチック成形品を提供する。

【解決手段】 2軸延伸ポリエステル樹脂層、ABS樹脂層が順次積層されてなる装飾シート1を用意し、該装飾シート1のABS樹脂層側と接するように未硬化組成物2を重ね合わせ、上型11と下型12からなる金型内で加熱加圧して両者を一体化する。2軸延伸ポリエステル樹脂層を用いることで、成形時の熱やSMCの流動性による応力に対してもシート自体が変形、流動、破れ等を生じることがなく、また裏打ちされたABS樹脂層により印刷絵柄層をSMCの流動やスチレンモノマーから保護するとともに、FRPと適度に相溶し強固な接着を発現することができる。



## 【特許請求の範囲】

【請求項1】 繊維質補強材で補強された熱硬化性樹脂の硬化物からなる成形品の表面にABS樹脂層、さらににその表面に2軸延伸ポリエステル樹脂層が順次この順に積層一体化されてなることを特徴とする繊維強化プラスチック成形品。

【請求項2】 2軸延伸ポリエステル樹脂層、ABS樹脂層が順次積層されてなる装飾シートを用意し、該装飾シートのABS樹脂層側と接するようにSMC若しくはBMCを重ね合わせ、金型内で加熱加圧して両者を一体化することを特徴とする繊維強化プラスチック成形品の製造方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、SMC (Sheet molding compound)、BMC (Bulk molding compound) 等により成形される繊維強化プラスチック (FRP = Fiber Reinforced Plastic) 成形品とその製造方法に関するものである。

## 【0002】

【発明が解決しようとする課題】従来、模様付きの繊維強化プラスチック (FRP) 成形品を製造する方法として、チタン紙、不織布、布、含浸紙等を成形同時一体化する方法 (例えば、特開昭48-12876号公報、特開昭51-20951号公報等参照) が知られているが、この方法では、①鮮明な印刷ができない、②破れなどが生じやすい、③成形性がなく形状が制限される、④物理的な投錨効果の接着であるため温度や圧力などの成形条件による接着性のバラツキが大きい、と言った欠点がある。

【0003】また、特開平7-60911号公報に開示されるように、印刷を施した熔融温度がFRP成形温度以上のプラスチックシートに不織布を2液硬化型ウレタン樹脂接着剤にて裏打ちし、このシートを成形時に一体化させるという方法も採られているが、この方法では裏打ちの工程が複雑である上に地合ムラ等により不織布の品質が不安定であり、コストが高くつくという問題点があった。

【0004】また別の方法として、特開昭56-72930号公報等に開示されるように、SMC樹脂との接着性の良い、すなわちSMC成形時の温度で熔融又は軟化するか或いはSMCの成分で膨潤して溶解するプラスチックシート乃至は印刷インキを用いた化粧シートを、成形時に一体化させる方法も知られているが、この方法ではSMCの熱硬化時の熱や流動時の応力により印刷層が流されて不良が出るという問題点がある。

【0005】本発明は、上記のような問題点に鑑みてなされたものであり、その目的とするところは、加熱、加圧時の柔軟性、強度が高く成形性が良く、成形体と装飾シートとの接着も良好で、鮮明で繊細な印刷を施すこと

ができる繊維強化プラスチック成形品及びその製造方法を提供することにある。

## 【0006】

【課題を解決するための手段】上記の目的を達成するため、本発明の繊維強化プラスチック成形品は、繊維質補強材で補強された熱硬化性樹脂の硬化物からなる成形品の表面にABS (アクリロニトリル・ブタジエン・スチレン共重合体) 樹脂層、さらににその表面に2軸延伸ポリエステル樹脂層が順次この順に積層一体化されてなることを特徴とする。

【0007】上記の繊維強化プラスチック成形品は、2軸延伸ポリエステル樹脂層、ABS樹脂層が順次積層されてなる装飾シートを用意し、該装飾シート (以下、単に「シート」とも呼称する。) のABS樹脂層側と接するようにSMC若しくはBMC等のFRPの原材料 (乃至は中間体) を重ね合わせ、金型内で加熱加圧して両者を一体化することにより製造される。

【0008】上記のように本発明では、2軸延伸ポリエステル樹脂層を用いることで、成形時の熱やSMCの流動性による応力に対してもシート自体が変形、流動、破れ等を生じることがなく、また裏打ちされたABS樹脂層により印刷絵柄層をSMCの流動やスチレンモノマーから保護するとともに、シートに適度な成形性を付与し、尚且つFRPと適度に相溶し、強固な接着を発現することができる。

## 【0009】

【発明の実施の形態】2軸延伸ポリエステル樹脂層としては、予め製膜したポリエステルシートを使用する。このシートは、透明性、引張強度、耐熱性、寸法安定性、印刷適性、耐汚染性及び耐溶剤性等に優れる。厚みとして10~200 $\mu$ mのものが使用できるが、望ましくは20~100 $\mu$ m程度である。薄すぎると強度や深み感が低下し、厚すぎると印刷適性、成形性及びコストの点で良くない。ポリエステル樹脂としては、ポリエチレンテレフタレート、ポリブチレンテレフタレート、エチレンテレフタレートイソフタレート共重合体、ポリエチレンナフタレート、ポリアリレート等が代表的なものである。

【0010】ABS (アクリロニトリル・ブタジエン・スチレン共重合体) 樹脂層としては、シートとして一般に製造されるものを使用する。これはコスト的にも比較的安価である。FRP (主に不飽和ポリエステル樹脂) 中のスチレンモノマーと成形時の熱圧により熔融密着し、相溶的に接着できる。また、同時にFRP中のスチレンモノマーが装飾層に達して装飾層が流動することを遮断する。厚みは10~500 $\mu$ mのものが使用できるが、望ましくは50~200 $\mu$ m程度である。薄すぎると成形時に熔融し、印刷層を保護できない。厚すぎると成形品の反りが大きくなったりコストアップになる。ABS樹脂層の適度な熱変形によって装飾シート全体の成



形性を向上せしめる。

【0011】2軸延伸ポリエステル樹脂層には、必要に応じて層自体或いは直下のFRPの耐候性を向上せしめるため、層中にベンゾトリアゾール、ベンゾフェノン、微粒子酸化セリウム等の紫外線吸収剤、ヒンダードアミン系ラジカル捕捉剤等の光安定剤を添加してもよい。紫外線吸収剤及び光安定剤とも添加量は0.1～5重量%程度である。また、2軸延伸ポリエステル樹脂層中には、透明性を失わない範囲内で必要に応じて染料、顔料等の着色剤を添加してもよい。

【0012】FRPの成分である熱硬化性樹脂としては、不飽和ポリエステル樹脂、ビニールエステル樹脂、ジアリルフタレート樹脂、熱硬化型アクリル樹脂、メラミン樹脂、グアナミン樹脂、フェノール樹脂、エポキシ樹脂、2液硬化型ポリウレタン樹脂等が挙げられる。

【0013】これらの熱硬化性樹脂から成形品を作るには、先ずこれらの樹脂の単量体或いはプレポリマー（オリゴマーも包含する）に架橋剤、重合開始剤、或いは反応促進触媒を加えたものに、短繊維、織布、不織布等の繊維質補強材とその他必要に応じ各種添加物を加えた未硬化組成物を用意する。この未硬化組成物、すなわちFRPの原材料乃至は中間体の形態として例えばSMC又はBMCの形態がある。

【0014】そして、図1(a)に示すように所定形状の成形型（上型11と下型12）の中に装飾シート1と未硬化組成物2とを重ね合わせて挿入し、図1(b)に示す如く型を閉じて加熱、加圧し、未硬化組成物2を架橋乃至は重合させて硬化させることにより、固体の成形品3とすると同時に装飾シート1を成形品3の表面に接着一体化せしめ、図1(c)に示すような化粧材を得る。その際、装飾シート1におけるABS樹脂の中に、FRP原材料乃至は中間体の中の未反応成分（単量体等）が浸透し、装飾シート1と成形品3との間の接着力を増強する。

【0015】未硬化組成物の代表的形態であるSMCについて詳述すると、SMCの材料は、ガラス繊維、炭素繊維、石綿、チタン酸カリウム等の繊維質補強剤、触媒、充填剤、離型剤等を混練した熱硬化性樹脂からなる。用いられる熱硬化性樹脂は通常不飽和ポリエステル樹脂のプレポリマーが代表的である。繊維質補強剤としては、通常ガラス繊維の短繊維が用いられる。このガラス繊維の含有量は通常10～70重量%である。充填剤としては、炭酸カルシウム、硫酸バリウム、水酸化アルミニウム等の粉末を用いる。離型剤としてはステアリン酸亜鉛等を用いる。その他、必要に応じてステレン単量体、多官能アクリレート（又はメタクリレート）単量体等の反応希釈剤、イソシアネート、アミン等の架橋剤、過酸化ベンゾイル、メチルエチルケトンパーオキシド、*t*-ブチルパーベンゾエイト、有機スルホン酸塩等の重合開始剤（硬化触媒）、ナフテン酸コバルト、ナフテ

ン酸マンガン等の硬化促進触媒、二酸化チタン、カーボンブラック、弁柄等の着色剤等を添加する。

【0016】2軸延伸ポリエステル樹脂層とABS樹脂層を積層するシートに施す装飾処理は、該シート中の2軸延伸ポリエステル樹脂層、ABS樹脂層の片方又は両方のそれ自体に染料、顔料等の着色剤を混練して施すことも可能であるが、一般的にはグラビア印刷、シルクスクリーン印刷等により行い、印刷絵柄は、木目柄、石目柄、布目柄、文字、幾何学模様、全面ベタ等である。FRP成形品を隠蔽する必要がある場合は、絵柄のFRP（SMC）側に全面ベタ層を一層設け、その全面ベタ層中に二酸化チタン、カーボンブラック等の隠蔽性の高い顔料を添加する。印刷インキは各種顔料（又は染料）とバインダー樹脂とからなる。バインダーは、2液硬化型ウレタン樹脂、アクリル樹脂、ポリエステル樹脂、塩化ビニル-酢酸ビニル共重合体、セルロース系樹脂、ポリビニルブチラール樹脂等の中から適宜選択して用いる。また装飾処理として、蒸着、スパッタリング等でアルミニウム、クロム等の金属薄膜を形成してもよい。この場合、金属薄膜は全面でもパターン状でもよい。装飾処理として施される印刷絵柄層や金属薄膜は、装飾シート全層が透明であればABS樹脂層の表面に施しても裏面（熱硬化性樹脂側）に施してもよい。なお必要に応じて、印刷を施す側の樹脂層（シート）表面に予めコロナ放電処理、プラズマ処理、易接着プライマーコート処理等の易接着処理を施しておいてもよい。

【0017】必要に応じて装飾シートの表面上にさらに合成樹脂からなる保護層を形成してもよい。この保護層は、装飾層を透視可能なように透明（無色或いは着色）なものを選ぶ。樹脂としては、成形性を重視する場合は熱可塑性樹脂を用い、また表面の耐擦傷性、耐薬品性等の物性を重視する場合は熱硬化性樹脂、電離放射線硬化性樹脂等の硬化性樹脂を用いる。厚さは要求性能に応じて適宜決めればよいが、通常1～100 $\mu$ m程度である。熱可塑性樹脂としては前記の樹脂が用いられる。ただし、保護層に用いる場合は反応性成分は添加しなくてもよい。熱硬化性樹脂としては、2液硬化型ポリウレタン樹脂、エポキシ樹脂、不飽和ポリエステル樹脂等が、電離放射線硬化性樹脂としては多官能不飽和（メタ）アクリレートの単量体、又はプレポリマー等が代表的である。なお、電離放射線としては通常紫外線或いは電子線が用いられる。耐候性を向上させる場合には、保護層中に前記のごとき紫外線吸収剤及び／又は光安定剤を添加する。

【0018】本発明の繊維強化プラスチック成形品の用途としては、建築物の壁、床、天井等の内装材、浴槽、洗面台、厨房器具等の住設器械、窓枠、扉等の建具、車輛、船舶等の乗物の内装材、容器、家電製品のキャビネット等を挙げることができる。

【0019】

## 【実施例】

(実施例) 装飾シートを次のようにして作製した。すなわち、2軸延伸ポリエチレンテレフタレートシート(ダイヤホイル製「T-100」、25 $\mu$ m厚)に、ヘキサメチレンジイソシアネートとアクリルポリオールからなる2液硬化型ポリウレタン樹脂をバインダーとするインキ(ザインクテック製「NL-ALFA」)を用いてグラビア印刷にてマーブル調大理石の石目模様を印刷して装飾層を形成した後、その印刷面に2液硬化型ポリウレタン樹脂接着剤(大日精化工業製「E-295」)を用いて着色ABSシート(三宝樹脂製「A402」、30 $\mu$ m厚)をドライラミネートした。

【0020】この装飾シートを、ABS面が不飽和ポリエステル樹脂と硝子繊維とからなるSMC(武田薬品製)と接するようにして重ね合わせ、これらを成型型内に設置してから、成形温度150℃、成形圧力100kgf/cm<sup>2</sup>で5分間加熱加圧してSMCを硬化させるとともに両者を接着一体化させた。これにより高意匠の浴室壁面パネルが得られた。装飾シートの破れ等の不良もなく、成形体と装飾シートの接着性、成形性も良好であった。また、装飾シートの剥離を試みたところ、シートと成形体の界面では剥離しなかった。

【0021】(比較例1) DAP含浸紙(坪量100g/m<sup>2</sup>のチタン紙にジアリルフタレートブレポリマーを含浸させたもの)に実施例と同様の柄印刷を施した装飾

シートを作製し、この装飾シートを用いて実施例1と同様にSMCと同時成形した。成形品には装飾シートの破れ、柄歪みが部分的に発生していた。

【0022】(比較例2) ポリメチルメタアクリレート系のアクリル樹脂シート/実施例と同様の印刷層/半硬質ポリ塩化ビニル樹脂(可塑剤DOP:20重量部)着色ベースシートの構成の装飾シートを作製し、この装飾シートを用いて実施例1と同様にSMCと同時成形した。成形品はシートが熔融し、破れ、シワ、柄流れが発生していた。また、SMCとシートの接着も十分ではなかった。

## 【0023】

【発明の効果】以上説明したように、本発明によれば、外観上の破れ、シワ、柄流れ、柄歪み等の不具合もなく、意匠的にも鮮明な印刷による表現ができ、FRPと強固に接着した製品を得ることができる。

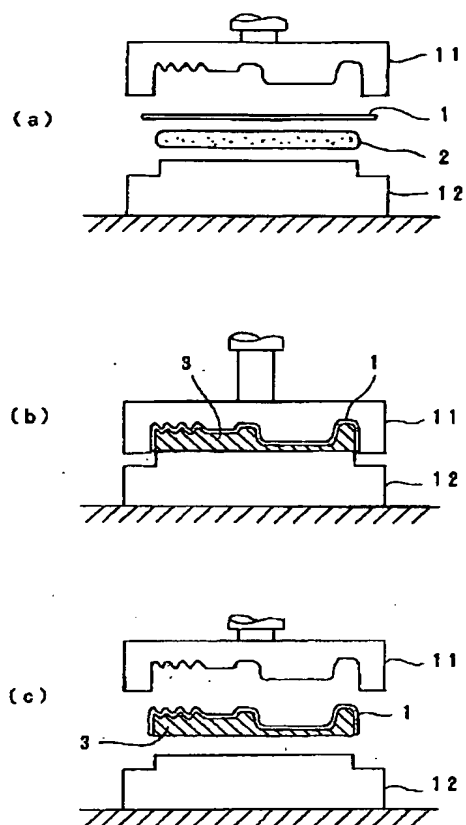
## 【図面の簡単な説明】

【図1】繊維強化プラスチック成形品の製造手順を説明するための工程図である。

## 【符号の説明】

- 1 装飾シート
- 2 未硬化組成物
- 3 成形品
- 11 上型
- 12 下型

【図1】



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